IN THE CLAIMS

1.(Currently Amended) A ~~B~~breathing assistance apparatus capable of operating in alternating inhalation and expiratory phases, the apparatus ~~and~~ comprising:

- ~~—~~a pressuri~~s~~zed respiratory gas source,
- ~~—~~control means capable of transmitting a reference value of a gas related parameter to the ~~said~~ pressurized respiratory gas source, the control means including selection means capable of selecting a pressure parameter or a flow rate parameter to define the reference value of the gas related parameter,
- ~~—~~an inhalation duct to supply ~~the~~ gas from the pressurized respiratory gas source to a patient,
- ~~—~~an expiratory duct for ~~the~~ expiratory gas of the patient,
- ~~—~~an inhalation valve disposed on the inhalation duct, the ~~said~~ inhalation valve comprising means ~~that~~ to allow the gas from the gas source to pass to make possible proportional operation, the inhalation ~~said~~ valve being controlled by means which are distinct from the pressuri~~s~~zed respiratory gas source,
- ~~—~~an expiratory valve on the expiratory gas source to help establish a positive expiratory pressure~~PEP~~,
- ~~sensors, respectively~~ a pressure sensor ~~(111)~~ and a flow rate sensor associated with ~~(112), on~~ the inhalation duct, and~~.~~

~~the apparatus being characterised in that:~~

- ~~the said control means comprise selection means (152) capable of selecting a pressure parameter or a flow rate parameter to define the said reference value for the gas source~~
- ~~the said selection means are controlled by~~ an automatic control unit for controlling the selection means, the automatic control unit being ~~(51), the said control unit being:~~

➢ connected to the pressure and flow rate sensors ~~situated on the inhalation duct~~ to form a direct closed regulation circuit for selecting a reference value parameter, and

➢ associated to a programme allowing ~~the~~ a selection to be made in real time from a pressure signal or flow rate signal, ~~.~~

• so that ~~the~~ association of a direct closed regulation loop for the selection of a particular reference value parameter with the inhalation or expiratory ~~a~~ valve permitting proportional operation~~,~~ allows real time control of barometric and volumetric operating modes of the breathing assistance apparatus, between or during the inhalation and expiratory phases ~~and during these phases~~.

2. (Currently Amended) Apparatus according to ~~the previous~~ claim 1, wherein ~~characterised in that~~ during the expiratory phases of the apparatus, the inhalation valve is operable to generate ~~capable of generating on its own~~ a leak rate to compensate ~~the~~ leaks~~,~~ so that no leak connection is associated with ~~to~~ the inhalation valve.

3. (Currently Amended) Apparatus according to ~~any of the previous~~ claims 1 or claim 2, wherein ~~characterised in that~~ the pressuri~~s~~zed respiratory gas source comprises ~~is~~ a centrifugal fan type turbine with an axial air intake and peripheral output and~~,~~ with an inertia value less than around 150 gcm^2.

4. (Currently Amended) Apparatus according to ~~any of the previous~~ claims 1, further comprising~~characterised in that~~:

• a second flow rate sensor ~~is~~ associated with ~~to~~ the expiratory duct, and

- comparison means, wherein the ~~said~~ flow rate sensors associated with ~~of~~ the inhalation and expiratory ducts are connected to the comparison means to compare ~~the~~ respective flow rates in the inhalation and expiratory ducts.

5. (Currently Amended) Apparatus according to ~~the previous~~ claim 4, further comprising ~~characterised in that the said comparison means are associated to~~ processing means operable to filter a ~~capable of filtering the~~ difference between the ~~said~~ respective flow rates in real time, the processing means being associated with the comparison means.

6. (Currently Amended) Apparatus according to ~~the previous~~ claim 5, wherein ~~characterised in that~~ the ~~said~~ processing means is ~~are~~ connected to the ~~said~~ automatic control unit, ~~and these processing means are connected~~ to a memory, and to a processor programmed to trigger a new inhalation phase when the ~~said~~ filtered difference is higher than a pre-determined threshold.

7. (Currently Amended) Apparatus according to ~~any of the previous~~ claim~~s~~ 1, wherein ~~characterised in that~~ the inhalation valve comprises:

- a valve body comprising an orifice connected to the inhalation duct, and,
- a moving element operable to block ~~capable of blocking~~ the ~~said~~ orifice in a closed position, and to at least partially free the ~~this~~ orifice in an ~~the~~ open position, the ~~said~~ moving element including ~~featuring~~ a recess for aligning ~~that can be aligned~~ with the ~~said~~ orifice ~~of the valve body~~ to allow the gas from the gas source to pass through to the inhalation duct, the ~~said~~ recess comprising:
  - a first part, having a ~~whose~~ geometry correspondings to a proportional operation of the inhalation

valve when the ~~said~~ first part is aligned with the ~~said~~ orifice, and

➢ ~~—~~a second part having a ~~, whose~~ geometry corresponding~~s~~ to ~~an~~ all or nothing operation of the inhalation valve when the ~~said~~ second part is aligned with the ~~said~~ orifice.

8. (Currently Amended) Apparatus according to ~~the previous~~ claim 7, wherein ~~characterised in that~~ the ~~said~~ recess is shaped so that when the ~~said~~ moving element moves ~~to move~~ the inhalation valve from ~~its~~ the closed position to ~~its~~ the open position, the ~~said~~ first part is ~~first of all~~ aligned with the recess~~,~~ and then the ~~said~~ second part is ~~then~~ aligned with the said recess~~,~~ if ~~this~~ movement continues.

9. (Currently Amended) Apparatus according to ~~the previous~~ claim 8, wherein~~characterised in that~~:

~~• the recess comprises:~~

➢ ~~—~~~~said~~ the first part of the recess is ~~more or~~ generally ~~less~~ triangular,

➢ ~~—~~the ~~said~~ second part of the recess is ~~more or~~ generally ~~less~~ rectangular, and~~.~~

~~•~~ ~~—~~a base of the triangle of the first part of the recess is parallel with one side of the rectangle of the second part of the recess.

10. (Currently Amended) Apparatus according ~~to any of the previous~~ claims 1, further comprising ~~characterised in that to control the PEP, the expiratory valve is controlled by~~ a micro-turbine operable to control the expiratory valve so that the positive expiratory pressure is controlled.

11. (Currently Amended) Apparatus according to ~~the previous~~ claim 10, wherein ~~characterised in that~~ the micro-turbine is

directly connected to the expiratory valve~~,~~ and no intermediate element is positioned between the micro-turbine and the expiratory valve.

12. (Currently Amended) An ~~o~~operating control process for controlling a breathing assistance apparatus comprising a pressurized respiratory gas source; control means capable of transmitting a reference value of a gas related parameter to the pressurized respiratory gas source, the control means including selection means capable of selecting a pressure parameter or a flow rate parameter to define the reference value of the gas related parameter; an inhalation duct to supply gas from the pressurized respiratory gas source to a patient; an expiratory duct for expiratory gas of the patient; an inhalation valve disposed on the inhalation duct, the inhalation valve comprising means to allow the gas from the gas source to pass to make possible proportional operation, the inhalation valve being controlled by means which are distinct from the pressurized respiratory gas source; an expiratory valve on the expiratory gas source to help establish a positive expiratory pressure; a pressure sensor and a flow rate sensor associated with the inhalation duct; and an automatic control unit for controlling the selection means, the process comprising:

operating a micro-turbine; and

closing the expiratory valve based on the micro-turbine to regulate a positive expiratory pressure during the expiratory phases~~of a apparatus of any of the previous claims, characterised in that to establish a PEP during the expiratory phases, the closure of the expiratory valve is controlled by a micro-turbine~~.

13. (Currently Amended) Process according to ~~the previous~~ claim 12, wherein ~~characterised in that when the apparatus operates,~~

the micro-turbine operates constantly and the expiratory valve is controlled by ~~the~~ selective connection of a pneumatic control line of the ~~said~~ expiratory valve with the micro-turbine.

14. (Currently Amended) A ~~P~~process for operating ~~an~~ a breathing assistance apparatus ~~according to any of claims 1 to 11~~ in a volumetric mode, the breathing assistance apparatus comprising a pressurized respiratory gas source; control means capable of transmitting a reference value of a gas related parameter to the pressurized respiratory gas source, the control means including selection means capable of selecting a pressure parameter or a flow rate parameter to define the reference value of the gas related parameter; an inhalation duct to supply gas from the pressurized respiratory gas source to a patient; an expiratory duct for expiratory gas of the patient; an inhalation valve disposed on the inhalation duct, the inhalation valve comprising means to allow the gas from the gas source to pass to make possible proportional operation, the inhalation valve being controlled by means which are distinct from the pressurized respiratory gas source; an expiratory valve on the expiratory gas source to help establish a positive expiratory pressure; a pressure sensor and a flow rate sensor associated with the inhalation duct; and an automatic control unit for controlling the selection means, the process comprising:~~characterised in that when a volumetric mode is~~

selecting~~ed the control of~~ the volumetric mode; and

~~delivered to a patient is obtained by the~~ controlling ~~of~~ the gas source on the basis of a measured pressure parameter on the inhalation duct;

wherein control of volume of the gas delivered to a patient is obtained by the control of the gas source.

15. (Currently Amended) Process according to ~~the previous~~ claim 14, wherein ~~characterised in that~~ no pressure difference between ~~an~~ upstream ~~part~~ and ~~a~~ downstream parts of the inhalation valve is used.

16. (Currently Amended) Process according to ~~one of the two the previous~~ claims 14, wherein ~~characterised in that said~~ control of the gas source is obtained through ~~the~~ control of the rotation speed of a rotor of ~~said~~ the gas source.